IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(S): Robert D. Christiansen   CONFIRMATION NO: 4838

SERIAL NO.:   10/701,144   GROUP ART UNIT: 2625

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SUBJECT: COOPERATIVE RASTERIZATION OF PRINT DATA
           IN AN ENTERPRISE NETWORK

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APPELLANTS'/APPLICANTS' OPENING BRIEF ON APPEAL

1. **REAL PARTY IN INTEREST.**

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holding, LLC.

2. **RELATED APPEALS AND INTERFERENCES.**

There are no other appeals or interferences known to Appellants, Appellants' legal representative or the Assignee which will affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

3. **STATUS OF CLAIMS.**

Claims 1-20 are pending but stand rejected. The rejections of all pending claims are appealed.

4. **STATUS OF AMENDMENTS.**

No amendments have been filed after the final action was entered. All previous amendments have been entered.

5. **SUMMARY OF CLAIMED SUBJECT MATTER.**

Claim 1 recites a method for cooperative rasterization of print data in an enterprise network. That enterprise network includes multiple printers. The method comprises rasterizing, by a primary printer of the multiple printers, a portion of a print job to input raster bits into a raster buffer associated with the primary printer. *See, e.g.,* Specification, paragraph [0045]; page 19, lines 15-27; and Fig. 7, step 704. A time taken to rasterize the portion of the print job is determined. *See, e.g.,* Specification, paragraph [0021]; page 8, lines 15-25; paragraph [0046]; page 20, lines 1-12; Fig. 7, step 708. The primary printer identifies a potential underflow condition of the raster buffer. *See, e.g.,* Specification, paragraph [0021]; page 8, lines 15-25; paragraph

[0046]; page 20, lines 1-12; Fig. 7, step 708. The potential underflow condition occurs if the determined time taken to RIP the portion of the print job is greater than a time that will be taken by the primary printer to print the portion of the print job. *See, e.g.,* Specification, paragraph [0021]; page 8, lines 15-25; paragraph [0046]; page 20, lines 1-12; Fig. 7, step 708. Responsive to identifying, the primary printer communicates an un-rasterized portion of the print job to the secondary printer for the secondary printer to rasterize. *See, e.g.,* Specification, paragraph [0049]; page 21, lines 10-24; Fig. 8, step 804. The primary printer does not rasterize the un-rasterized portion. *See, e.g.,* Specification, paragraph [0049]; page 21, lines 10-24; Fig. 8, step 804. The primary printer receives raster bits corresponding to the un-rasterized portion from the secondary printer. *See, e.g.,* Specification, paragraph [0049]; page 21, lines 10-24; Fig. 8, step 806. The primary printer prints all raster bits corresponding to the print job. *See, e.g.,* Specification, paragraph [0050]; page 21, line 25 to page 22, line 9; Fig. 9, steps 902-904.

Claim 11 recites a computer-readable medium comprising computer-program instructions executable by a processor coupled to the computer-readable medium. The computer-program instructions comprise instructions for performing the method as recited in claim 1. The method comprises rasterizing, by a primary printer of the multiple printers, a portion of a print job to input raster bits into a raster buffer associated with the primary printer. *See, e.g.,* Specification, paragraph [0045]; page 19, lines 15-27; and Fig. 7, step 704. A time taken to rasterize the portion of the print job is determined. *See, e.g.,* Specification, paragraph [0021]; page 8, lines 15-25; paragraph [0046]; page 20, lines 1-12; Fig. 7, step 708. The primary printer identifies a potential underflow condition of the raster buffer. *See, e.g.,* Specification, paragraph [0021]; page 8, lines 15-25; paragraph [0046]; page 20, lines 1-12; Fig. 7, step 708. The potential underflow condition occurs if the determined time taken to RIP the portion of the print job is greater than a time that will be taken by the primary printer to print the portion of the print job. *See, e.g.,* Specification, paragraph [0021]; page 8, lines 15-25; paragraph [0046]; page 20, lines 1-12; Fig. 7, step 708. Responsive to identifying, the primary printer communicates an un-rasterized portion of the print job to the secondary

printer for the secondary printer to rasterize. *See, e.g.*, Specification, paragraph [0049]; page 21, lines 10-24; Fig. 8, step 804. The primary printer does not rasterize the un-rasterized portion. *See, e.g.*, Specification, paragraph [0049]; page 21, lines 10-24; Fig. 8, step 804. The primary printer receives raster bits corresponding to the un-rasterized portion from the secondary printer. *See, e.g.*, Specification, paragraph [0049]; page 21, lines 10-24; Fig. 8, step 806. The primary printer prints all raster bits corresponding to the print job. *See, e.g.*, Specification, paragraph [0050]; page 21, line 25 to page 22, line 9; Fig. 9, steps 902-904.

Claim 12 recites a computer-readable media comprising computer-program instructions for cooperative rasterization of print data in an enterprise network. The enterprise network including multiple printers. The computer-program instructions comprising instructions for implementing a method. The method comprises rasterizing, by a primary printer of the multiple printers, a portion of a print job to input raster bits into a raster buffer associated with the primary printer. *See, e.g.*, Specification, paragraph [0045]; page 19, lines 15-27; and Fig. 7, step 704. A time taken to rasterize the portion of the print job is determined. *See, e.g.*, Specification, paragraph [0021]; page 8, lines 15-25; paragraph [0046]; page 20, lines 1-12; Fig. 7, step 708. The primary printer identifies a potential underflow condition of the raster buffer. *See, e.g.*, Specification, paragraph [0021]; page 8, lines 15-25; paragraph [0046]; page 20, lines 1-12; Fig. 7, step 708. The potential underflow condition occurs if the determined time taken to RIP the portion of the print job is greater than a time that will be taken by the primary printer to print the portion of the print job. *See, e.g.*, Specification, paragraph [0021]; page 8, lines 15-25; paragraph [0046]; page 20, lines 1-12; Fig. 7, step 708. Responsive to identifying, the primary printer communicates an un-rasterized portion of the print job to the secondary printer for the secondary printer to rasterize. *See, e.g.*, Specification, paragraph [0049]; page 21, lines 10-24; Fig. 8, step 804. The primary printer does not rasterize the un-rasterized portion. *See, e.g.*, Specification, paragraph [0049]; page 21, lines 10-24; Fig. 8, step 806. The primary printer receives raster bits corresponding to the un-rasterized portion from the secondary printer. *See, e.g.*, Specification, paragraph [0049]; page 21, lines 10-24; Fig. 8, step 806. The primary

printer prints all raster bits corresponding to the print job. *See, e.g.*, Specification, paragraph [0050]; page 21, line 25 to page 22, line 9; Fig. 9, steps 902-904.

Claim 19 recites a computing device for cooperative rasterization of print data in an enterprise network. The enterprise network comprising a primary printer and at least one secondary printer. The computing device comprises a processor and a memory. *See, e.g.*, Specification, paragraphs [0040]-[0042]; page 17, line 17 to page 18, line 23; Fig. 1, elements 124 and 128. The memory includes computer-program instructions executable by the processor. *See, e.g.*, Specification, paragraphs [0040]-[0042]; page 17, line 17 to page 18, line 23; Fig. 1, elements 109, 110, 112, and 134. The computer-program instructions comprise instructions for implementing a method. That method includes rasterizing a portion of a print job to input raster bits into a raster buffer associated with the primary printer. *See, e.g.*, Specification, paragraph [0045]; page 19, lines 15-27; and Fig. 7, step 704. A time taken to rasterize the portion of the print job is determined. *See, e.g.*, Specification, paragraph [0021]; page 8, lines 15-25; paragraph [0046]; page 20, lines 1-12; Fig. 7, step 708. A potential underflow condition of the raster buffer is identified. *See, e.g.*, Specification, paragraph [0021]; page 8, lines 15-25; paragraph [0046]; page 20, lines 1-12; Fig. 7, step 708. The potential underflow condition occurring if the determined time taken to RIP the portion of the print job is greater than a time that will be taken by the primary printer to print the portion of the print job. *See, e.g.*, Specification, paragraph [0021]; page 8, lines 15-25; paragraph [0046]; page 20, lines 1-12; Fig. 7, step 708. Responsive to identifying, the primary printer sends an un-rasterized portion of the print job to a secondary printer in the enterprise. *See, e.g.*, Specification, paragraph [0049]; page 21, lines 10-24; Fig. 8, step 804. The primary printer receives associated raster bits from the secondary printer. The associated raster bits have been generated by the secondary printer from the un-rasterized portion. *See, e.g.*, Specification, paragraph [0049]; page 21, lines 10-24; Fig. 8, step 804. Responsive to receiving, the primary printer inserts the associated raster bits into the raster buffer such that raster buffer underflow conditions are avoided at the primary printer. *See, e.g.*, Specification, paragraph [0049]; page 21, lines 10-24; Fig. 8, step 804.

6. **GROUNDS FOR REJECTION TO BE REVIEWED.**

A. Claims 1-20 stand rejected under 35 USC §102 as being anticipated by US Pub 2002/0102119 to Christodoulou.

7. **ARGUMENT.**

Grounds For Rejection A – Claims 1-20 stand rejected under 35 USC §102 as being anticipated by US Pub 2002/0102119 to Christodoulou.

A claim is anticipated under 35 USC §102 "only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). *See also* MPEP 2131. "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

Christodoulou describes a system in which print jobs may have time constraints, that is, the print job needs to be completed within a given time frame. For such print jobs, the rasterization of a print job can be distributed across two or more printers. Christodoulou describes a print manager operating on a computer (40) manages all printing operations. Christodoulou, paragraph [0030]. Upon receipt of a print job, the print manager assesses its size and identifies a primary printer. Before the primary printer RIPs any portion of the print job (step 510 of Fig. 5A), the print manager, first determines if the primary printer is capable of printing the print job within a predetermined period of time (step 506, Fig. 5A). If not, the print manager divides the print job, sending one portion to the primary printer and a second portion to a secondary printer (steps 526 and 528, Fig. 5A). The two printers RIP their respective portions (steps 530 and 534, Fig. 5A) and the primary printer prints the print job (step 614, Fig. 5B).

In other words, Christodoulou describes a system in which the determination to distribute the rasterization of a print job is made prior to any portion of that print job being rasterized. As discussed below, each independent claim, in appropriate form, recites that at least a portion of the print job is first rasterized before a determination is made to distribute the rasterization to other printers.

Claims 1 is directed to a method for cooperative rasterization of print data in an enterprise network that includes multiple printers. As amended, Claim 1 recites the following:

1. rasterizing, by a primary printer of the multiple printers, a portion of a print job to input raster bits into a raster buffer associated with the primary printer;

2. determining a time taken to rasterize the portion of the print job;

3. identifying, by the primary printer, a potential underflow condition of the raster buffer, the potential underflow condition occurring if the determined time taken to RIP the portion of the print job is greater than a time that will be taken by the primary printer to print the portion of the print job;

4. responsive to identifying, the primary printer communicating an un-rasterized portion of the print job to the secondary printer for the secondary printer to rasterize, the primary printer not rasterizing the un-rasterized portion;

5. receiving, by the primary printer, raster bits corresponding to the un-rasterized portion from the secondary printer; and

6. printing, by the primary printer, all raster bits corresponding to the print job.

Claim 1 recites rasterizing a portion of a print job, determining how long it took to rasterize that portion, and then identifying a potential underflow condition that occurs if the time taken for rasterizing the portion exceeds the time taken for printing that portion. If a potential underflow condition is identified, then the rasterization of the print job is

distributed across two or more printers. In other words, according to Claim 1, the determination of whether the rasterization of a print job is to be distributed across multiple printers occurs after a portion of that print job has been rasterized and a time taken for rasterizing that portion has been determined.

As explained above, Christodoulou teaches making the determination as to whether rasterization of a print job is to be distributed across multiple printers before any part of the print job has been rasterized or even communicated from Christodoulou's print manager to a printer. Christodoulou's Figure 5A, reproduced below, provides confirmation.
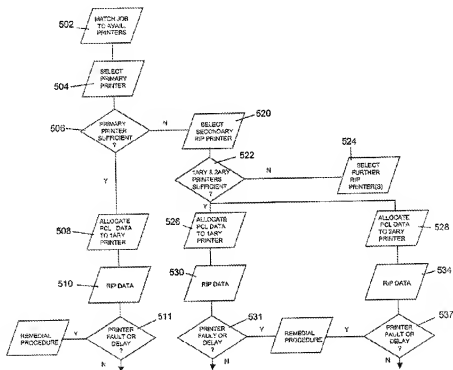

Fig. 5A

As one can see, all of Christodoulou's data is RIPed in steps 510, 530, 534 after the determination as to whether the primary printer is sufficient is conducted in step 506. According to Christodoulou's paragraph [0033], the determination of step 506 involves determining whether the primary printer has the innate capacity, based on the size of the print job, to RIP and print the print job within a pre-determined time. Step 506 also takes into account whether other factors unique to the primary printer affect that determination. As one can see in the Figure below, no data is allocated to be RIPed

(steps 508, 526, 528) and no data is RIPed (step 510, 530, 534) until after the determination of step 506 is made.

Claim 1 recites "determining a time taken to rasterize the portion of the print job." This is the actual time taken – not an estimates such as is made in Christodoulou's step 506. Claim 1 recites "identifying, by the primary printer, a potential underflow condition of the raster buffer." The underflow condition arises if that actual time taken to rasterize the portion is greater than the time that will be needed to print that same portion. Christodoulou mentions nothing of comparing an actual time taken to rasterize of portion of a print job with a time that will be needed to print that same portion.

Consequently, Christodoulou fails to teach or suggest (a) rasterizing, by a primary printer of the multiple printers, a portion of a print job to input raster bits into a raster buffer associated with the primary printer, (b) determining a time taken to rasterize the portion of the print job, and then (c) identifying, by the primary printer, a potential underflow condition of the raster buffer, the potential underflow condition occurring if the determined time taken to RIP the portion of the print job is greater than a time that will be taken by the primary printer to print the portion of the print job.

For at least this reasons, Claim 1 is patentable over Christodoulou as are Claims 2-10 which depend from Claim 1.

Claim 11 is directed to a computer-readable medium comprising computer-program instructions executable by a processor coupled to the computer-readable medium, the computer-program instructions comprising instructions for performing operations such as those recited in a method as recited in claim 1. For at least the same reasons Claim 1 is patentable, so is Claim 11.

Claim 12 is directed to computer-readable media comprising computer-program instructions for cooperative rasterization of print data in an enterprise network. The media includes instructions for implementing the method of Claim 1. For at least the same reasons Claim 1 is patentable, so are Claim 12 and Claims 13-18 which depend from Claim 12.

Claim **19** is directed to a computing device having various components for implementing the method of Claim 1. For at least the same reasons Claim 1 is patentable, so are Claim 19 and Claim 20 which depends from Claim 19.

Conclusion: In view of the foregoing remarks, the Applicant respectfully submits that the pending claims are in condition for allowance. Consequently, early and favorable action allowing these claims and passing the application to issue is earnestly solicited.

Respectfully submitted,

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September 18, 2008

APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

1. (previously presented) A method for cooperative rasterization of print data in an enterprise network, the enterprise network including multiple printers, the method comprising:

rasterizing, by a primary printer of the multiple printers, a portion of a print job to input raster bits into a raster buffer associated with the primary printer;

determining a time taken to rasterize the portion of the print job;

identifying, by the primary printer, a potential underflow condition of the raster buffer, the potential underflow condition occurring if the determined time taken to RIP the portion of the print job is greater than a time that will be taken by the primary printer to print the portion of the print job;

responsive to identifying, the primary printer communicating an un-rasterized portion of the print job to the secondary printer for the secondary printer to rasterize, the primary printer not rasterizing the un-rasterized portion;

receiving, by the primary printer, raster bits corresponding to the un-rasterized portion from the secondary printer; and

printing, by the primary printer, all raster bits corresponding to the print job.

2. (previously presented) A method as recited in claim 1, wherein identifying further comprises:

evaluating, by the primary printer, whether communicating the un-rasterized portion to the secondary printer would at least minimize the potential underflow condition; and

only performing the communicating if the evaluating indicates that operations of the secondary printer to assist the primary printer in its rasterization operations would at least minimize the potential underflow condition.

3. (original) A method as recited in claim 2, wherein evaluating further comprises determining objective criteria comprising respective amounts of time for: the primary

printer to transmit the un-rasterized portion to the secondary printer, the secondary printer to rasterize the un-rasterized portion, and the primary printer to receive the raster bits from the secondary printer.

4. (original) A method as recited in claim 3, wherein the respective amounts of time are based on data persisted by the primary printer.

5. (original) A method as recited in claim 2, wherein evaluating further comprises determining, by the primary printer, that operations of the secondary printer to assist the primary printer in its rasterization operations would eliminate the potential underflow condition.

6. (original) A method as recited in claim 1, wherein the method further comprises:
responsive to identifying, the primary printer calculating a number of secondary printers of the multiple printers to communicate respective un-rasterized portions of the print job to respectively rasterize, the secondary printer being included in the number, the un-rasterized portion being included in the respective unrasterized portions;
not rasterizing, by the primary printer, any of the respective un-rasterized portions;
wherein communicating further comprises, the primary printer sending the un-rasterized portions to respective ones of the number of secondary printers; and
wherein receiving further comprises, receiving, by the primary printer, raster bits corresponding to the respective un-rasterized portions from respective ones of the number of secondary printers.

7. (original) A method as recited in claim 6, wherein sending and receiving at least minimizes the potential underflow condition.

8. (original) A method as recited in claim 6, wherein sending and receiving eliminates the potential underflow condition.

9. (original) A method as recited in claim 6, further calculating the number of secondary printers further comprises determining the number according to the following:

$$Secondary\,\Pr\text{int}\,erCount = \left\lceil \frac{RipTime - \Pr\text{int}\,EngineTime}{\Pr\text{int}\,EngineTime} \right\rceil.$$

10. (original) A method as recited in claim 6, further calculating the number of secondary printers further comprises determining the number according to the following:

$$Secondary\,\Pr\text{int}\,erCount = \left\lceil \frac{RIPTime\ for\ a\ Single\ Page}{Transfer\ Time + \operatorname{Re}ceive\ Time} \right\rceil.$$

11. (previously presented) A computer-readable medium comprising computer-program instructions executable by a processor coupled to the computer-readable medium, the computer-program instructions comprising instructions for performing the method as recited in claim 1.

12. (previously presented) A computer-readable media comprising computer-program instructions for cooperative rasterization of print data in an enterprise network, the enterprise network including multiple printers, the computer-program instructions comprising instructions for:

rasterizing, by a primary printer of the multiple printers, a portion of a print job to input raster bits into a raster buffer associated with the primary printer;
determining a time taken to rasterize the portion of the print job;

identifying, by the primary printer, a potential underflow condition of the raster buffer, the potential underflow condition occurring if the determined time taken to RIP the portion of the print job is greater than a time that will be taken by the primary printer to print the portion of the print job; and

responsive to identifying:

evaluating, by the primary printer, whether communicating the un-rasterized portion to the secondary printer would at least minimize the potential underflow condition; and

if the evaluating indicates that operations of the secondary printer to assist the primary printer in its rasterization operations would at least minimize the potential underflow condition, communicating the un-rasterized portion to the secondary printer for the secondary printer to rasterize, the primary printer not rasterizing the un-rasterized portion, the primary printer being configured to receive and print raster bits corresponding to the un-rasterized data.

13. (original) A computer-readable medium as recited in claim 12, wherein the computer-program instructions further comprise instructions for:

receiving, by the primary printer, raster bits corresponding to the un-rasterized portion from the secondary printer; and

printing, by the primary printer, all raster bits corresponding to the print job.

14. (original) A computer-readable medium as recited in claim 12, wherein evaluating further comprises instructions for determining objective criteria comprising respective amounts of time for: the primary printer to transmit the un-rasterized portion to the secondary printer, the secondary printer to rasterize the un-rasterized portion, and the primary printer to receive the raster bits from the secondary printer.

15. (original) A computer-readable medium as recited in claim 12, wherein evaluating further comprises determining, by the primary printer, that operations of the secondary printer to assist the primary printer in its rasterization operations would eliminate the potential underflow condition.

16. (original) A computer-readable medium as recited in claim 12, wherein the computer-program instructions further comprise instructions for:

calculating a number of secondary printers of the multiple printers to communicate respective un-rasterized portions of the print job to respectively rasterize,

the secondary printer being included in the number, the un-rasterized portion being included in the respective unrasterized portions;

not rasterizing, by the primary printer, any of the respective un-rasterized portions;

communicating the primary printer sending the un-rasterized portions to respective ones of the number of secondary printers;

receiving, by the primary printer, raster bits corresponding to the respective un-rasterized portions from respective ones of the number of secondary printers; and

printing, by the primary printer, all raster bits corresponding to the print job.

17. (original) A computer-readable medium as recited in claim 16, wherein the instructions of calculating the number of secondary printers further comprises:

determining a rasterization time (RIPtime) to rasterize a portion of the un-rasterized portions;

determining a transmit time to send the portion to a secondary printer of the secondary printers;

determining a receive time for the primary printer to receive raster bits corresponding to the portion from the secondary printer;

resolving that the transmit time plus the receive time is greater than an amount of time (PrintEngineTime) that the primary printer would take to print a single page of the print job; and

responsive to resolving, formulating the number of secondary printers according to the following:

$$Secondary\,\mathrm{Pr\,int}\,erCount = \left\lceil \frac{RIPtime - \mathrm{Pr\,int}\,EngineTime}{\mathrm{Pr\,int}\,EngineTime} \right\rceil.$$

18. (original) A computer-readable medium as recited in claim 16, wherein the instructions of calculating the number of secondary printers further comprises:

determining a rasterization time (RIPtime) to rasterize a page of the un-rasterized portions;

determining a transmit time to send the page to a secondary printer of the secondary printers;

determining a receive time for the primary printer to receive raster bits corresponding to the page from the secondary printer;

resolving that the transmit time plus the receive time is greater than an amount of time (PrintEngineTime) that the primary printer would take to print raster bits corresponding to a single page of the print job; and

responsive to resolving, formulating the number of secondary printers according to the following:

$$Secondary\ \Pr int\ erCount = \left| \frac{RIPtime}{transfer\ time + receive\ time} \right|.$$

19. (previously presented) A computing device for cooperative rasterization of print data in an enterprise network, the enterprise network comprising a primary printer and at least one secondary printer, the computing device comprising:

a processor; and

a memory coupled to the processor, the memory comprising computer-program instructions executable by the processor, the computer-program instructions comprising instructions for:

rasterizing a portion of a print job to input raster bits into a raster buffer associated with the primary printer;

determining a time taken to rasterize the portion of the print job;

identifying a potential underflow condition of the raster buffer, the potential underflow condition occurring if the determined time taken to RIP the portion of the print job is greater than a time that will be taken by the primary printer to print the portion of the print job;

responsive to identifying:

sending, by the primary printer, an un-rasterized portion of the print job to a secondary printer in the enterprise;

receiving, by the primary printer, associated raster bits from the secondary printer, the associated raster bits having been generated by the secondary printer from the un-rasterized portion; and

responsive to receiving, inserting, by the primary printer, the associated raster bits into the raster buffer such that raster buffer underflow conditions are avoided at the primary printer.

20. (original) A computing device as recited in claim 19, wherein the computer-program instructions further comprise instructions for:

evaluating in view of anticipated raster buffer underflow whether the primary printer will complete printing the print job faster than if the secondary printer assists the primary printer to rasterize an un-rasterized portion of the print job; and

performing the operations of sending, receiving, and inserting only if it has been determined that the primary printer will not print the print job as quickly without rasterizing assistance from the secondary printer.

Evidence Appendix

There is no extrinsic evidence to be considered in this Appeal. Therefore, no evidence is presented in this Appendix.

Related Proceedings Appendix

There are no related proceedings to be considered in this Appeal. Therefore, no such proceedings are identified in this Appendix.

REMARKS

Claims 1-20 are pending in the present application but stand rejected. Claims 1, 12, and 18 have been amended. In view of the amendments and the following remarks, the Applicant requests the Examiner's thoughtful reconsideration.

Claim Rejections – 35 USC §102: The Examiner rejected Claims 1-20 under §102 as being anticipated by US Pub 2002/0102119 to Christodoulou.